west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3218
Plant ID No.:	033-00213
Applicant:	M3 Appalachia Gathering, LLC
Facility Name:	Lumberport Booster Station
Location:	Lumberport, Harrison County
NAICS Code:	48621
SIC Code:	1311
Application Type:	Construction
Received Date:	August 18, 2014
Engineer Assigned:	Laura Jennings
Fee Amount:	$1,500
Date Received:	August 21, 2014
Complete Date:	November 6, 2014
Applicant Ad Date:	November 1, 2014
Newspaper:	*The Dominion Post*
UTM's:	Easting: 553.8401 km Northing: 4,357.4925 km Zone: 17
Lat/Long:	Latitude: 39.36522 Longitude: -80.37501
Description:	Construction and operation of a natural gas booster station

DESCRIPTION OF PROCESS

Lumberport Booster Station will be comprised of one compressor engine (3616B), designated as Emission Source C-201 (aka CE-1). The engine type is LB4S (Lean Burn, 4-Stroke).

Wet, raw natural gas is gathered at approximately 880 psig as it enters the Station. After the gas enters the Station, it is separated and either flows into the compressor (C-201) at 128.9 MMSCFD, or into a fuel gas scrubber (V-400). Gas that passes through the fuel gas scrubber is utilized to power the compressor, the discharge coalesce filter (V-123), and the engine coolant pump (P-480). Once the gas passes through the compressor, it flows through the discharge coalesce filter.

Liquids separated at the fuel gas scrubber and at the discharge coalesce filter are stored in a

produced water tank (T-420). Compressor skid drains are routed to a waste oil/ water drain tank (T-450). Liquids from these tanks are collected by truck and sent for disposal.

Compressed gas leaves the station at approximately 1110 psig and is delivered into the main HP gathering system.

Emission Units Table:

Emission Unit ID	Emission point ID	Emission Unit Description	Year Installed / Modified	Design Capacity	Type and Date of Change	Control Device
CE-1S	1E	Caterpillar G3616-LE Engine	2014	4,735 hp/ 1,000 prm	New	A/F Ratio
2S	2E	Produced Water Tank (T-420)	2014	30 BBL	New	None
3S	3E	Waste Oil Tank (T-450)	2014	30 BBL	New	None
4S	4E	Coolant Make-up Tank (T-470)	2014	500 GAL	New	None
5S	5E	Coolant Drain Tank (T-480)	2014	500 GAL	New	None
6S	6E	Engine Lube Oil Make-Up Tank (T-460)	2014	500 GAL	New	None
7S	7E	Compressor Lube Oil Make-Up Tank (T-461)	2014	500 GAL	New	None
2T	2TL	Produced Water Tank Truck Loading	2014	459,900 gal/yr	New	Vapor Balance
3T	3TL	Waste Oil Tank Truck Loading	2014	459,900 gal/yr	New	Vapor Balance
4T	4TL	NORKOOL SLH50 Tank Truck Loading	2014	182,500 gal/yr	New	Vapor Balance
5T	5TL	Coolant Tank Truck Loading	2014	182,500 gal/yr	New	Vapor Balance
6T	6TL	Lube Oil Tank Truck Loading	2014	182,500 gal/yr	New	Vapor Balance
7T	7TL	Lube Oil Tank Truck Loading	2014	182,500 gal/yr	New	Vapor Balance

SITE INSPECTION

Brian Tephabock of DAQ's Compliance and Enforcement Section conducted a site visit on December 9, 2014. Brian noted a concern with the proximity to the closest dwelling and acknowledged that because of the opportunity for public comment, there is not a citing criteria requirement like there is with the General Permits. He noted that noise if not reduced may be a concern for the residents; however, noise is not regulated by DAQ. The writer inquired about possible noise reduction efforts by the company and was informed that they will be installing a silencer at the exhaust and will have a building that will surround the compressor.

Directions to the Lumberport Compressor Stations (from WV DEP Offices) located at 601 57th Street Southeast, Charleston, WV:

- Head northeast on 57th Street SE toward Washington Avenue SE
- Take the second left onto MacCorkle Avenue SE
- Turn right onto 36th Street SE
- Continue onto 36th Stree Bridge
- Take the ramp on Interstate 64 W
- Take the I-77North/I-79 North exit toward Parkersburg
- Continue on I-79 North, follow signs for Clarksburg
- Take Exit 121 toward County Route 24/ Meadowbrook Road
- Turn left onto Johnson Avenue
- Continue onto Meadowbrook Road
- Continue onto Co. Rte 24
- Slight right onto US Route 19 North/WV-20 North
- Turn left onto WV-20 North
- Turn right onto Reeses Run
- Slight left onto Reeses Run Road
- Access road is on the right

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

All emission calculations were reviewed and verified by the writer. The methodology and potential emissions are provided in the tables below. Please note that the permit will not have emission limits for any storage tanks below 20,000 gallons consistent with DAQ policy.

Calculation Methodology Table:

Emission Unit ID#	Process Equipment	Calculation Methodology
CE-1S	Caterpillar G3616-LE Engine	Manufacturer's Data for NO_X, CO, VOC, and Formaldehyde. AP-42 emission factors for SO_2, $PM_{10.}$ Fuel throughput is 34,876 scfh and 305.51 mmscfy
2S	Produced Water Storage Tank (T-420)	TANKS 4.09d
3S	Waste Oil Tank (T-450)	TANKS 4.09d

Emission Unit ID#	Process Equipment	Calculation Methodology
4S	Coolant Make-up Tank (T-470)	TANKS 4.09d
5S	Coolant Drain Tank (T-480)	TANKS 4.09d
6S	Engine Lube Oil Make-Up Tank (T-460)	TANKS 4.09d
7S	Compressor Lube Oil Make-Up Tank (T-461)	TANKS 4.09d
2T	Produced Water TT Loading	AP-42, Section 5.2-1
3T	Waste Oil Tank Truck Loading	AP-42, Section 5.2-1
4T	NORKOOL SLH50 Tank Truck Loading	AP-42, Section 5.2-1
5T	Coolant Tank Truck Loading	AP-42, Section 5.2-1
6T	Lube Oil Tank Truck Loading	AP-42, Section 5.2-1
7T	Lube Oil Tank Truck Loading	AP-42, Section 5.2-1
Fugitives	Equipment Leaks	Component Count, EPA Protocol for Eqpt Leak Emission Estimates, Nov. 95

Control Device Table:

Emission Units	Control Device	Pollutant	Control Efficiency
CE-1S; Caterpillar G3616-LE Engine	EMIT Technologies; EBH-9000-2036D-6C4E-48	CO	>65%
		VOCs	>50%
		Formaldehyde	>73%

Emissions Summary Table:

Emission Point ID	Control Device	Regulated Pollutant	Maximum Potential Uncontrolled Emissions		Maximum Potential Controlled Emissions	
			lb/hr	tpy	lb/hr	tpy
CE-1S	SCR + A/F Ratio	NO_X	n/a	n/a	5.22	22.87
		CO	0.02	0.09	10.02	43.90
		VOC	n/a	n/a	3.34	14.63
		SO_2	0.02	0.09	0.02	0.09
		PM	0.35	1.55	0.35	1.55
		$PM_{2.5}$	< 0.01	0.01	< 0.01	0.01
		Formaldehyde	n/a	n/a	0.73	3.20
		Acetaldehyde	0.30	1.31	0.30	1.31
		Total HAPs	n/a	n/a	1.37	5.99
		CO_2e	5787	25345	5787	25345
2E	None	VOC	0.03	0.12	0.03	0.12
		Methanol	0.03	0.12	0.03	0.12
		n-Hexane	< 0.01	< 0.01	< 0.01	< 0.01
		Toluene	< 0.01	< 0.01	< 0.01	< 0.01
		Benzene	< 0.01	< 0.01	< 0.01	< 0.01
		Total HAPs	0.03	0.12	0.03	0.12
4E	None	VOC	< 0.01	< 0.01	< 0.01	< 0.01
		Total HAPs	< 0.01	< 0.01	< 0.01	< 0.01
5E	None	VOC	< 0.01	< 0.01	< 0.01	< 0.01
		Total HAPs	< 0.01	< 0.01	< 0.01	< 0.01
2TL	None	VOC	0.23	1.02	0.23	1.02
		Methanol	0.01	0.06	0.01	0.06
		n-Hexane	0.02	0.10	0.02	0.10
		Toluene	0.19	0.83	0.19	0.83
		Benzene	0.01	0.02	0.01	0.02
		Total HAPs	0.23	1.02	0.23	1.02

Fugitives	None	VOC	.08	.35	.08	.35

Note: The Oil Tanks (3S, 6S, 7S) , the Coolant Truck Loading (4TL, 5TL), and the Oil Truck Loading (3TL, 6TL, 7TL) have negligible emissions and are not provided in the table.

Facility PTE Emissions Table (including fugitive emissions):

Pollutant	**Hourly PTE (lb/hr)**	**Annual PTE (tpy)**
Nitrogen Oxides	5.22	22.87
Carbon Monoxide	10.02	43.90
PM	0.35	1.55
$PM_{2.5}$	<0.01	0.01
Sulfur Dioxide	0.02	0.09
Volatile Organic Compounds	3.68	16.12
Total HAPs	1.71	7.13
Carbon Dioxide Equivalent	5787	25345

REGULATORY APPLICABILITY

Applicable State Regulations:

45CSR13 (Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation)

The uncontrolled potential emissions associated with the proposed project are greater than the minor source construction permit thresholds of 6 pounds per hour (pph) and 10 tons per year (tpy) of any regulated air pollutant o4 144 pounds per day (ppd) of any regulated air pollutant OR 2 pph OR 5 tpy of aggregated hazardous air pollutants OR 45 CSR27 toxic air pollutant OR subject to applicable substantive rule. The applicant has demonstrated compliance with 45CSR13 by submitting a complete permit application and by publishing a Class I legal advertisement in *The Dominion Post,* on November 1, 2014.

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

The facility is subject to 45CSR16 because they are subject to NSPS, Subparts JJJJ and OOOO.

45CSR22 (Air Quality Management Fee Program)

The applicant has paid all applicable fees for the permit application. This facility will be required to maintain a valid Certificate to Operate on the premises.

45CSR34 (Emission Standards for Hazardous Air Pollutants)

The applicant is subject because they are subject to 40CFR63, Subpart ZZZZ.

Applicable Federal Regulations:

40CFR60, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))

40CFR60 Subpart JJJJ establishes emission standards for applicable SI ICE.

Caterpillar G3616-LE Engine is in the category of engines greater than or equal to 500 horsepower (except lean burn 500 <HP< 1,350 and gasoline or rich burn LPG) that commenced construction after June 12, 2006 and were manufactured on or after July 1, 2007. The engine is subject to the emission standards of Table 1 for engines manufactured after July 1, 2010 and are as follows: NO_X 1.0 g/HP-hr, 2.0 CO g/HP-hr, and VOC 0.7 g/HP-hr (not including formaldehyde).

The emission factors were provided by the manufacturer and verified during the review of the emission calculations by the writer. The controlled emissions meet the emission standards in §60.4233 (e).

M3 Appalachia Gathering purchased a non-certified engine and is subject to the following requirements:

60.4243(b)(2): Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233 (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(ii) of this section.

> (ii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

Performance testing must follow the procedures in paragraphs (a) through (f) of 60.4244.

Notification, Reports, and Record requirements per 60.4245(a), (c), and (d).

40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

> EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

There are no gas wells at this facility. Therefore, all requirements regarding gas well affected facilities under 40 CFR 60 Subpart OOOO would not apply.

c. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment.

There is a reciprocating internal combustion engine located at this facility that will be constructed after August 23, 2011. Therefore, the requirements regarding reciprocating compressors under Subpart OOOO will apply.

M3 Appalachia Gathering will be required to perform the following for the Lumberport Booster Station:

- *Replace the reciprocating compressor rod packing at least every 26,000 hours of operation or 36 months;*
- *Demonstrate initial compliance by continuously monitoring the number of hours of operation or track the number of months since the last rod packing replacement;*
- *Submit the appropriate start-up notifications;*
- *Submit the initial annual report for the reciprocating compressors;*
- *Maintain records of hours of operation since last rod packing replacement, records of the date and time of each rod packing replacement, and records of deviations in cases where the reciprocating compressor was not operated in compliance.*

d. Pneumatic Controllers

- Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh which commenced construction after August 23, 2011, and is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not located at a natural gas processing plant.

- Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller which commenced construction after August 23, 2011, and is located at a natural gas processing plant.

The onsite controllers will be electric. Therefore, there are no applicable pneumatic controllers which commenced construction after August 23, 2011. Therefore, all requirements regarding pneumatic controllers under 40 CFR 60 Subpart OOOO would not apply.

e. Each storage vessel affected facility, which is a single storage vessel, located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of non-earthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

- Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.

- Process vessels such as surge control vessels, bottoms receivers or knockout vessels.

- Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup. The compliance date for applicable storage vessels is October 15, 2013.

The storage vessels that will be located at the Lumberport Booster Station each have a potential to emit less than 6 tpy of VOC. Therefore, the facility is not required by this section to further reduce VOC emissions by 95%.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. The engine (CE-1S) at the Lumberport Booster Station is subject to the area source requirements for non-emergency spark ignition engines.

The applicability requirements for new stationary RICEs located at an area source of HAPs, is the requirement to meet the standards of 40CFR60 Subpart JJJJ. These requirements were outlined above. The proposed engine meets these standards.

The following rules do not apply to the facility:

45CSR30 (Requirements for Operating Permits)

M3 Appalachia Gathering is subject to 45CSR30 because the internal combustion engine at the Lumberport Booster Station is subject to 40CFR60 Subparts JJJJ and OOOO; however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source. The facility does not meet the definition of a major source.

40CFR60 Subpart Kb (Standards of Performance for VOC Liquid Storage Vessels)

This subpart does not apply to vessels with a design capacity of less than or equal to 419,204 gallons used for petroleum or condensate stored, processed, or treated prior to custody transfer. The produced water storage tank at this facility is well below this threshold.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Non-criteria regulated hazardous air pollutants such as acetaldehyde, formaldehyde, and toluene may be emitted when natural gas is combusted in reciprocating engines.

Listed below is information regarding each of these hazardous air pollutants.

Acetaldehyde:
Acetaldehyde is mainly used as an intermediate in the synthesis of other chemicals. It is ubiquitous in the environment and may be formed in the body from the breakdown of ethanol. Acute (short-term) exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic (long-term) intoxication of acetaldehyde resemble those of alcoholism. Acetaldehyde is considered a probable human carcinogen (Group B2) based on inadequate human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.

Formaldehyde:
Formaldehyde is used mainly to produce resins used in particle board products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

Toluene:
The acute toxicity of toluene is low. Toluene may cause eye, skin, and respiratory tract irritation. Short-term exposure to high concentrations of toluene (e.g., 600 ppm) may produce fatigue, dizziness, headaches, loss of coordination, nausea, and stupor; 10,000 ppm may cause death from respiratory failure. Ingestion of toluene may cause nausea and vomiting and central nervous

system depression. `Contact of liquid toluene with the eyes causes temporary irritation. Toluene is a skin irritant and may cause redness and pain when trapped beneath clothing or shoes; prolonged or repeated contact with toluene may result in dry and cracked skin. Because of its odor and irritant effects, toluene is regarded as having good warning properties. The chronic effects of exposure to toluene are much less severe than those of benzene. No carcinogenic effects were reported in animal studies. Equivocal results were obtained in studies to determine developmental effects in animals. Toluene was not observed to be mutagenic in standard studies.

AIR QUALITY IMPACT ANALYSIS

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) as seen in the table listed in the Regulatory Discussion Section.

MONITORING OF OPERATIONS

- Monitor and record the hours of operation and the amount of natural gas consumed for the engine.
- Monitor the catalytic oxidizer control device
- Monitor all applicable requirements of 40CFR60 Subparts JJJJ and OOOO.
- Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engines and ancillary equipment.
- Record the monthly and annual throughput of the produced water tank truck loading

RECOMMENDATION TO DIRECTOR

It is recommended that permit R13-3218 be granted to M3 Appalachia Gathering, LLC for the Lumberport Booster Station located in Lumberport, Harrison County WV. Based on the information provided in the application, including all supplemental information received, the company should be in compliance with all state and federal regulations by demonstrating compliance with the permit requirements.

_____

Laura Jennings
Permit Engineer

_____

Date